

(12) UK Patent Application (19) GB (11) 2 255 956⁽¹³⁾A

(43) Date of A publication 25.11.1992

(21) Application No 9215553.0

(22) Date of filing 28.03.1990

Date lodged 22.07.1992

(62) Derived from Application No 9006952.7 under Section 15(4) of the Patents Act 1977

(71) Applicant

Leslie Stephen Harry Salmon
Court House Farm, Swanlow Lane, Winsford,
Cheshire, United Kingdom

(72) Inventor

Leslie Stephen Harry Salmon

(74) Agent and/or Address for Service

Barker, Brettell & Duncan
138 Hagley Road, Edgbaston, Birmingham,
B16 9PW, United Kingdom

(51) INT CL⁵

A01F 29/10, B02C 23/02, B60P 1/44

(52) UK CL (Edition K)

B8E EX19
A4C CB C129
U1S S1100 S1280

(56) Documents cited

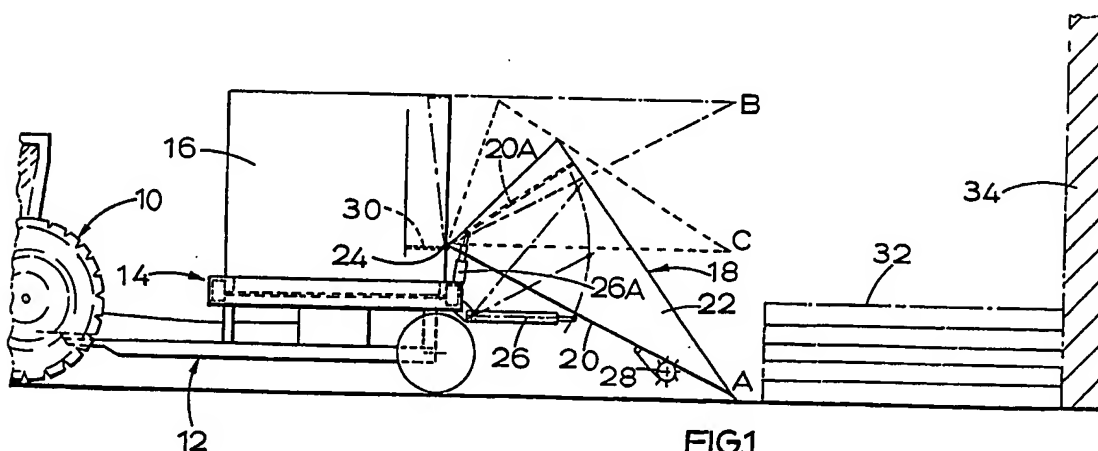
GB 1515580 A EP 0223004 A

(58) Field of search

UK CL (Edition K) A4C CB CUG, B8E EX19
INT CL⁵ A01F 29/00 29/10, B02C 23/02, B60P 1/44

(54) Processing apparatus for baled materials

(57) Apparatus for shredding large bales of straw comprises a shredding mechanism (14) surrounded in part by a part-cylindrical vertical wall (16) and in part by a movable loading chute (18). The loading chute (18) is movable from a lowered position in which it slopes to the ground to a feeding position in which it slopes in towards the shredding mechanism (14). The apparatus can be driven towards a bale with its chute (18) lowered so that the chute slides under the bale, and the chute then raised to lift the bale and cause it to slide towards the shredding mechanism (14). The bale is fed into the shredder inclined at an angle, and may break into pieces before entering the shredder. This places less strain on the shredding mechanism (14) since it does not support the full weight of the bale. The loading chute is provided with a one-way device (28) e.g. a rotating spiked roller to prevent the bale slipping off the chute.



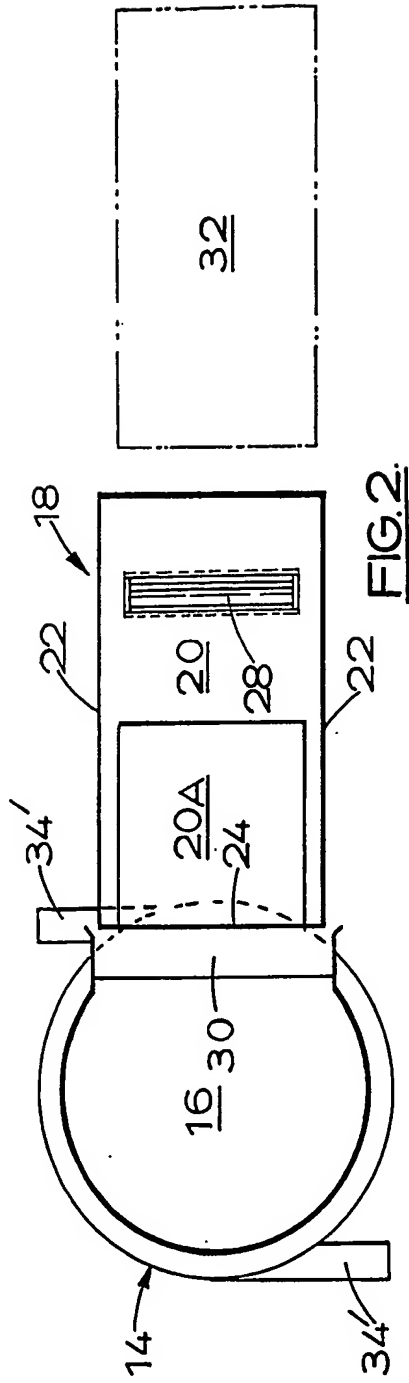


FIG. 2.

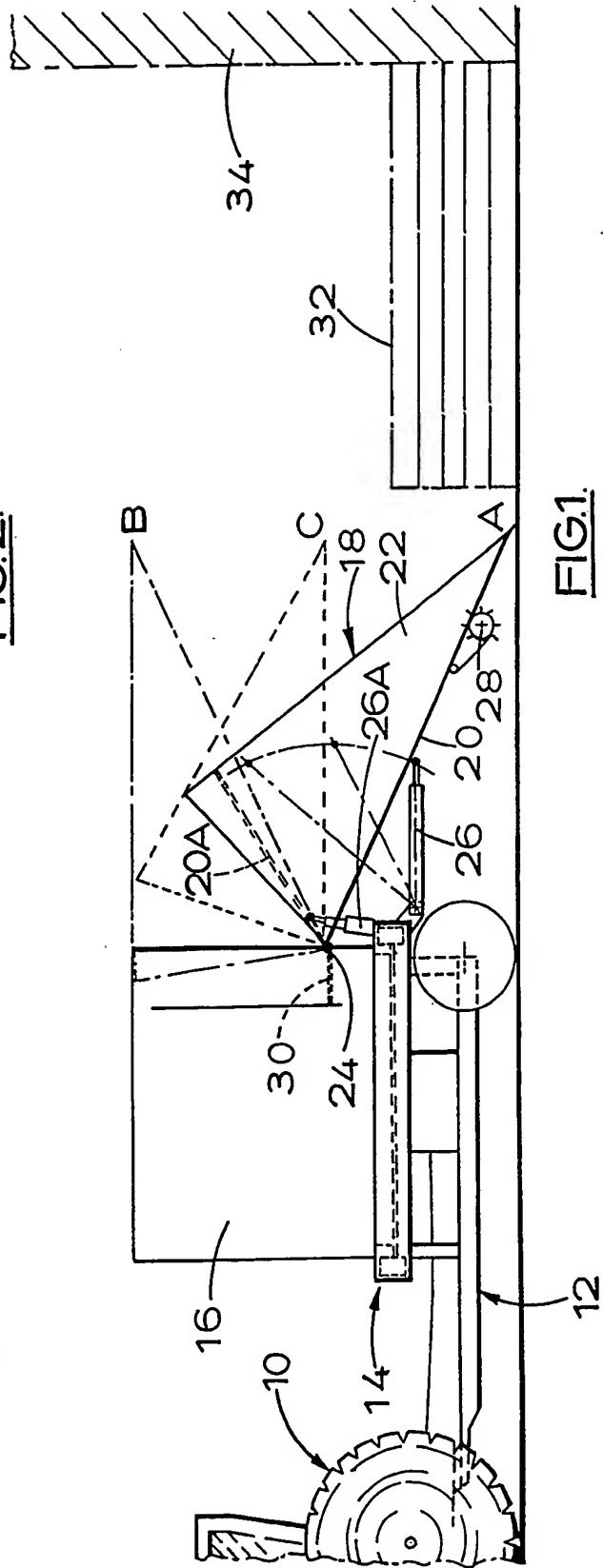


FIG. 1.

2/2

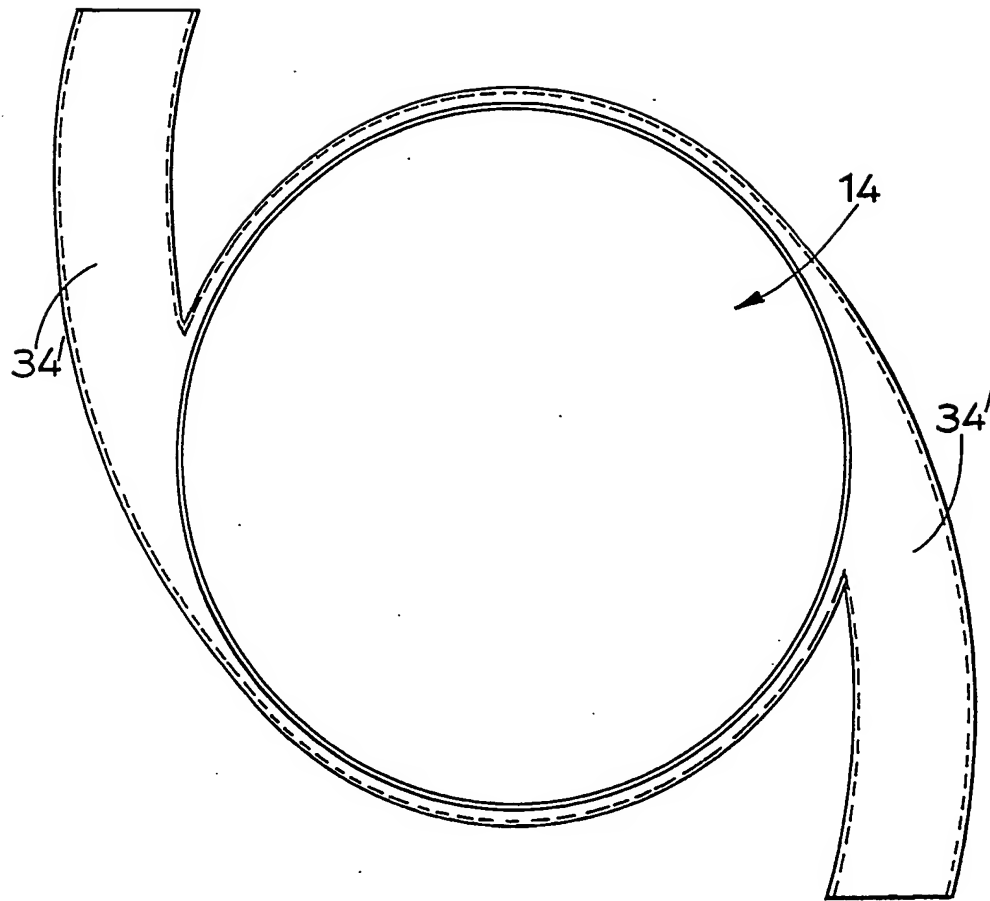


FIG. 3.

PROCESSING APPARATUS FOR BALED MATERIALS

This invention relates to mobile apparatus for processing baled bulk material, typically for agricultural use in the shredding and distributing of animal bedding or fodder from the larger sizes of "square" bale.

Individual bales produced by many patterns of modern agricultural harvesting machinery are very substantial in size and weight. Some machines form square section bales some 2.4 m (8 ft) in length which may weigh as much as 500 kg. These large "square" bales are preferred to the large size "round" (i.e. cylindrical) bales for more economical loading and transporting in quantity. Modern policies condemning the waste and pollution caused by straw burning in the field have encouraged harvesting of straw and its bulk transport from cereal growing regions to livestock rearing regions for use as bedding etc.

It will be readily appreciated that the handling of these large bales is difficult and may be hazardous if carried out with unsuitable equipment or by unskilled operatives, not only is there the risk of injury to personnel but also of damage to shredders or other processing apparatus if extreme care is not taken.

There is also increasing emphasis on safety as regards use of processing apparatus such as bale shredders in ensuring that moving parts such as shredding blades are safely fenced and that machines are designed so that there is minimum likelihood of operatives coming into contact with or being put in peril by such moving parts e.g. in loading the apparatus or due to malfunction such as jamming. In

some cases farm safety and health legislation, e.g. in the U.K., dictates design requirements for apparatus of this type.

The object of the invention is to provide mobile processing apparatus as referred to above which is safe, efficient and reliable in operation in handling even the largest sizes of bales of bulk material in an effective and economical manner and with minimum requirement of manpower or ancillary equipment such as separate loaders or other lifting gear.

According to the invention there is provided mobile apparatus for processing baled bulk material comprising a support structure in the form of a trailer or other vehicle, or adapted to be mounted on a tractor or other vehicle in use; processing means carried by said structure for performing an operation on the material in use e.g. shredding the baled bulk for distribution from the apparatus; a receiver carried on said structure in association with the processing means for positioning the bulk material in order for it to be acted on by said means; and loading means for selectively lifting and passing one or more bales of the material to the receiver as required for its replenishment, the loading means including a pick-up chute having an inboard end disposed for transfer of material therefrom to the receiver and an outboard end operatively remote from the receiver, and elevating means for selective angling of the chute between a loading position at which the outboard end is substantially at ground level so that the chute slopes upward to the receiver and an infeed position at which said outboard end is higher than the inboard end so that the chute slopes downwardly to the receiver;

whereby a bale or bales resting on the ground can be operatively urged onto the chute by shifting the apparatus to slide said outboard end beneath them, may be picked up by elevating said chute so that it or they rest thereon, and/or may be fed into the receiver either in mass or progressively by elevating the chute to or towards said infeed position, and in which the pick-up chute includes a one-way feed device operatively engaging the bale or bales with little resistance to movement up the chute at the loading position but substantial resistance to downward movement thereof at said position.

Preferably said one way feed device co-acts with the underface of the bale or bales and may take the form of one or more spiked or serrated rollers or wheels free to rotate, at least when the chute is in the loading position, in one direction only. However, it is also contemplated that said device could comprise one or more static, resilient, or resiliently mounted flaps, prongs or tines in or on floor or side wall structure of the chute to engage the bale or bales so as to permit their movement in one direction only.

The invention is of particularly effective application when embodied in mobile agricultural bale shredding and distributing apparatus of the kind described and claimed in GB Patent 2122480, and/or in European Patent Application 89312088, and/or in GB Patent Application 9004521.

This Application has been divided out from Application No. 9006952.7 (Publication No. 2243593A).

An example of the invention is now more particularly described with reference to the accompanying drawings wherein:

Figure 1 is a diagrammatic side elevation of an agricultural bale shredding machine;

Figure 2 is a diagrammatic plan view of the machine, and

Figure 3 is a plan view of an alternative construction of delivery arrangement in said machine.

The apparatus is a trailer type agricultural bale shredding and distributing machine operatively drawn by and powered from an agricultural tractor 10.

It comprises a support structure or chassis 12 carrying processing means in the form of shredding mechanism 14 generally as described in our said Patent and/or Patent applications to which reference is made for details of its construction and operation, briefly it includes a shredding rotor (not shown) driven about a vertical axis at the bottom of a cylindrical receiver 16.

Receiver 16 is dimensioned to accommodate the larger sizes of "round" or "square" bales stood on end, for example it may have an internal diameter of around 1.5 m.

The machine further includes loading means in the form of a chute 18 having a planar floor 20 wide enough for a large "square" bale to pass lengthways therealong between a pair of upstanding parallel side walls 22

which taper in height from a maximum at the inboard end of the chute to floor level at its extreme outboard end.

Chute 18 is pivoted about a horizontal hinge axis 24 transversely of the machine at the inboard end across the lower edge of a rearwardly directed opening in the wall of receiver 16 a short distance above the level of the shredding mechanism 14.

Elevating means, in this example a hydraulic ram 26 acting between chassis 12 and an intermediate part of the floor 20 can be selectively operated to elevate and lower the whole chute angularly with respect to receiver 16.

At its lowermost position shown in full lines at A in Figure 1 and referred to as the loading position the lowermost end of chute 18 is at ground level and it can be raised through an intermediate position shown in broken lines at C at which floor is substantially horizontal, to a higher infeed position shown in broken lines at B at which floor 20 slopes downwardly towards receiver 16. An inboard portion 20A of floor 20 is hinged on axis 24 for angular movement independently of the remainder of chute 18 and is operated by a subsidiary ram 26A to be swung apart to the position relative to said remainder shown in broken lines in Figure 1.

The loading means further includes a one-way feed device, in this example comprising a roller 28 having a spiked or serrated periphery journaled transversely across the chute floor 20 a short distance from its outboard end, a segment of the spiked periphery projecting just above the plane of the floor. A

ratchet or other braking mechanism allows roller 28 to rotate freely in one direction only, anti-clockwise as viewed in Figure 1, so that the undersurface of a bale resting on the chute can move freely towards the receiver 16 but motion in the reverse direction, i.e. slipping back down chute 18 when it is in the loading position, is resisted.

The opening in the wall of receiver 16 is provided with a horizontal fixed sill 30 over which material passes from chute 18 before it can move downwardly onto the shredding mechanism 14 as it enters the receiver 16.

In operation the machine is driven in reverse with the chute 18 at the loading position A to force the floor 20 of the chute below a large "square" bale 32 resting on the ground. The bale can be prevented from slipping backwards by positioning its end remote from the machine against a wall, post or other fixed structure 34 or possibly against a stack of further bales, thus as the machine continues to reverse the bale will ride up the chute 18 until all its undersurface is resting on floor 20. It is prevented from slipping back by the action of the one-way roller 28.

Once the bale is so positioned the machine can be drawn forwards slightly to clear the wall or other structure 34 and the chute 18 will be elevated by operating ram 26 towards position B until the bale slides down at an angle to lie across sill 30, its leading lower corner abutting mechanism 14 (which will not yet have been set in motion).

The machine, with the chute carrying bale 32, can then be driven to wherever required, e.g. to a stockyard or stockpen to be spread with bedding straw from the bale.

It will be noted that no manhandling of the bale is required for it to be picked up in this way, apart possibly from positioning it on the ground, and in particular there is no necessity for lifting equipment such as a front end loader to be used, nor is it even necessary in some cases for the operative to leave the seat of tractor 10 to carry out the operation. Preferably a forward facing portion of the wall of receiver 16 is provided with a transparent or mesh covered opening or window to provide a line of sight to the rear end to facilitate loading.

Before commencing shredding of the bale the operative will lower chute 18 to the horizontal position so that the bale tips back to rest on the chute at position C. He then cuts and removes the bale securing bands.

The shredding mechanism is then started and the chute is further elevated progressively towards the infeed position B so that the now unfastened bale slides forward and over sill 30. If this is done in a controlled manner the bale will break into sections as it drops from sill 30 onto the shredding mechanism 14 to be acted on thereby. In this way excess strain and loading on the mechanism is avoided as the full weight of the entire bale is not applied simultaneously to the shredding mechanism 14.

To facilitate cutting and removal of the bale bands a gap may be provided between the rear edge of

sill 30 and the front edge of chute floor 20 when chute 18 is horizontal for access to the underside of the bale about $1/4$ to $1/3$ of its length from the forward end after it has been slid forward as referred to above.

To ensure that the last part of the bale is consumed and does not lodge against sill 30 the portion 20A of floor 20 will be swung upwards by operating ram 26A, which with the chute 18 at position B, brings said portion near vertical in the container opening to push all the bale therein.

The shredding mechanism will be operated in known manner to deliver the loose straw or other material shredded from the bale to one or both sides of the path of forward travel of the machine through delivery spouts 34' (Figure 2) which extend tangentially of the circular shrouding of the mechanism 14.

Preferably said delivery spouts 34' are shaped as illustrated in Figure 3 in order to comply with safety requirements that moving parts of the machine, i.e. the rotor of shredding mechanism 14, shall not be readily accessible to an operative's hand by inserting the arm up one of the sprouts 34', for example in an attempt to clear a blockage. To achieve this while retaining compact construction, in particular avoiding excessive width of the machine, instead of the sprouts 34' being rectilinear in tangential relation to the circular shroud of mechanism 14 they are radiused as illustrated in the drawing giving increased effective length between their outer ends and the rotor of some 650 mm minimum to the junction with the main part of the shroud so that it is not possible to reach the rotor blades.

CLAIMS

1. Mobile apparatus for processing baled bulk material comprising a support structure in the form of a trailer or other vehicle, or adapted to be mounted on a tractor or other vehicle in use; processing means carried by said structure for performing an operation on the material in use; a receiver carried on said structure in association with the processing means for positioning the bulk material in order for it to be acted on by said means; and loading means for selectively lifting and passing one or more bales of the material to the receiver as required for its replenishment, the loading means including a pick-up chute having an inboard end disposed for transfer of material therefrom to the receiver and an outboard end operatively remote from the receiver, and elevating means for selective angling of the chute between a loading position at which the outboard end is substantially at ground level so that the chute slopes upward to the receiver and an infeed position at which said outboard end is higher than the inboard end so that the chute slopes downwardly to the receiver; whereby a bale or bales resting on the ground can be operatively urged onto the chute by shifting the apparatus to slide said outboard end beneath them, may be picked up by elevating said chute so that it or they rest thereon, and may be fed into the receiver either in mass or progressively by elevating the chute to or towards said infeed position, and in which the pick-up chute includes a one-way feed device operatively engaging the bale or bales with little resistance to movement up the chute at the loading position but

substantial resistance to downward movement thereof at said position.

2. Apparatus according to claim 1 in which said one way feed device co-acts with the bale or bales.

3. Apparatus according to claim 2 in which the one way feed device comprises one or more spiked or serrated rollers or wheels free to rotate, at least when the chute is in the loading position, in one direction only.

4. Apparatus according to any preceding claim in which the processing means comprises bale shredding means, and in which the chute bears a substantial part of the weight of the bale or bales during shredding operation of the apparatus, thereby relieving the bale shredding means of the full weight of the bale or bales during shredding operation.

5. Apparatus according to any preceding claim in which the loading means further comprises further bale-biasing means movable relative to the chute, the further bale-biasing means being movable from a rest position to an operative position in which it effectively further inclines the floor of the chute adjacent the processing means.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9215553.0

Relevant Technical fields

(i) UK Cl (Edition K) A4C CUG CB BSE EX19

(ii) Int Cl (Edition 5) B02C 23/02 A01F 29/00
 29/10 B60P 1/44

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

D MCMUNN

Date of Search

20 AUGUST 1992

Documents considered relevant following a search in respect of claims

1-5

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 1515580 (HESSTON)	1
A	EP 0223004 (BEKEER)	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).